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10/729,006	12/08/2003	Fumitaka Toyomura	03500.017767.	9107

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EXAMINER

BERDICHEVSKY, MIRIAM

ART UNIT	PAPER NUMBER
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1795

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/729,006	Applicant(s) TOYOMURA, FUMITAKA	
	Examiner MIRIAM BERDICHEVSKY	Art Unit 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 May 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6, 8, 9 and 13-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6, 8-9, 13-16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Remarks

Claims 1-6, 8-9, and 13-16 are currently pending.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. Claims 1-5, 8-9 and 13-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Toyomura (US 20020179140) in view of Kondo (20020038667).

As to claim 1, Toyomura teaches a solar cell module comprising at least one power conversion unit (110) each having a plurality of solar cell elements (106) and a power converter which is a DC-DC converter or an inverter provided in a position corresponding to a region surrounded by all the solar cell elements (107) (Figure 1) ([0062]).

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Toyomura is silent to each of the plurality of solar cell elements being electrically connected directly to the power converter.

Kondo teaches directly connecting each solar battery directly to an inverter/power converter (figure 1).

It would have been obvious to one of ordinary skill in the art at the time to electrically connect the converter solar conversion units to an adjacent converter of a conversion unit in order to increase the number of parallel connected modules by sequentially repeating cascade connection and to prevent current over flow, as taught by Kondo ([0003] and [0005]).

Regarding claim 2, Toyomura teaches at least two power conversion units (Figure 8) and modified Toyomura teaches the electrical connection of several solar battery units (solar power converters) to each converter/inverter connected to a converter/inverter of an adjacent conversion unit (Kondo: Figure 1).

Regarding claim 3, Toyomura teaches that the outputs of the solar cell elements are inputted to the power converter corresponding to the solar cell elements and the power converter converts the inputted outputs of the solar cell elements and outputs the converted outputs ([0065]).

Regarding claim 4, Toyomura teaches that all output terminals of the solar cell elements are electrically connected to all input terminals of the power converters (a power converter, 107) corresponding to the output terminals respectively ([0065]).

Regarding claim 5, Toyomura teaches that a plurality of input terminals of the power converters are provided on the same and one surface (As claim 1 only requires

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one power conversion unit with a converter, the sole converter will inherently have its input terminals on the same and one surface).

As to claims 8-9, Toyomura teaches a solar cell module comprising at least one power conversion unit (110) having a plurality of solar cell elements arranged (106) on a plane and a power converter which is a DC-DC converter or an inverter (107) (Figure 1). The Examiner notes that the connections between the solar elements in Figure 1 depict the connections between solar element terminals such that the solar elements can achieve their intended function (electricity flow).

Toyomura is silent to the power converter is arranged in the closest position between the terminal members in a state of arranging the solar cell elements (claim 8) or is arranged in a position of minimizing a sum of all collecting losses when collecting the power generated by the solar cell elements (claim 9).

It would have been obvious to one of ordinary skill in the art at the time of the invention to arrange the power converter in the closest position between the terminal members or to arrange the power converter in a position of minimizing a sum of all collecting losses when collecting the power generated by the solar cell elements, in order to tailor the output for a particular function and to minimize the wire/connection lengths/materials. Moreover, it would be obvious to try arranging the power converter in such a position with a reasonable expectation of success especially since it has been held that rearranging parts of an invention involves only routine skill in the art and is merely a design choice (MPEP 2141 III).

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Further regarding claims 8-9, Toyomura is silent to each of the plurality of solar cell elements being electrically connected directly to the power converter.

Kondo teaches directly connecting each solar battery directly to an inverter/power converter (figure 1).

It would have been obvious to one of ordinary skill in the art at the time to electrically connect the converter solar conversion units to an adjacent converter of a conversion unit in order to increase the number of parallel connected modules by sequentially repeating cascade connection and to prevent current over flow, as taught by Kondo ([0003] and [0005]).

As to claim 13, Toyomura teaches a solar cell module comprising at least one power generation unit (110) having a plurality of solar cell elements (106) and a terminal box ([0158] and [0165]).

Toyomura is silent to the terminal box being in a position corresponding to a region surrounded by all the solar cell elements to collect outputs of the solar cell elements.

It would have been obvious to one of ordinary skill in the art at the time of the invention to position the terminal box in a region surrounded by all the solar cell elements in order to minimize the wire/connection lengths/materials. Moreover it would be obvious to try arranging the power converter in such a position with a reasonable expectation of success especially since it has been held that rearranging parts of an invention involves only routine skill in the art and is merely a design choice.(MPEP 2141

III)

Further regarding claim 13, Toyomura is silent to each of the plurality of solar cell elements being electrically connected directly to the power converter.

Kondo teaches directly connecting each solar battery directly to an inverter/power converter (figure 1).

It would have been obvious to one of ordinary skill in the art at the time to electrically connect the converter solar conversion units to an adjacent converter of a conversion unit in order to increase the number of parallel connected modules by sequentially repeating cascade connection and to prevent current over flow, as taught by Kondo ([0003] and [0005]).

Regarding claim 14, Toyomura teaches that at least two of the power generation units are included and each power generation unit is electrically connected to a terminal box of an adjacent power generation unit (Figure 8) ([0165]).

Regarding claim 15, Toyomura teaches a solar cell module comprising at least one power conversion unit (110) each having two adjacent solar cell elements (106) (figure 1) and a terminal box ([0158] and [0165]).

Toyomura is silent to a terminal box provided in a position corresponding to a region on extension of a gap between the two adjacent solar cell elements to collect outputs of the two adjacent solar cell elements.

It would have been obvious to one of ordinary skill in the art at the time of the invention to position the terminal box in a gap between the two adjacent solar cell elements to collect outputs of the two adjacent solar cell elements in order to minimize the wire/connection lengths/materials. Moreover it would be obvious to try arranging the

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power converter in such a position with a reasonable expectation of success especially since it has been held that rearranging parts of an invention involves only routine skill in the art and is merely a design choice.(MPEP 2141 III)

Further regarding claim 15, Toyomura is silent to each of the plurality of solar cell elements being electrically connected directly to the power converter.

Kondo teaches directly connecting each solar battery directly to an inverter/power converter (figure 1).

It would have been obvious to one of ordinary skill in the art at the time to electrically connect the converter solar conversion units to an adjacent converter of a conversion unit in order to increase the number of parallel connected modules by sequentially repeating cascade connection and to prevent current over flow, as taught by Kondo ([0003] and [0005]).

Regarding claim 16, modified Toyomura as applied to claim 15 above teaches at least two of the power generation units are included and each power generation unit is electrically connected to a terminal box of an adjacent power generation unit ([0165]).

4. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Toyomura and Kondo as applied to claim 1, and further in view of Takehara et al. (6,331,670).

In regard to claim 6, modified Toyomura teaches a variety of materials from which the solar elements can be made ([0055]-[0058]) but is silent to the photovoltaic layer of each of the solar cell element specifically being a pn-junctions or a pin-junctions of two or more layers.

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Takehara et al. discloses a photovoltaic/solar cell array (Figure 3) of each of the solar cell elements has p-n junctions (303 a, b, c) or pin junctions of two or more layers (col. 9; lines: 13-23). It is obvious to those skilled in the art to utilize a p-n junction for solar cell elements since their ability to allow current to flow easily in only one direction as evidence given by Jackson et al., **Handbook of Semiconductors Technology**, Vol. 2., Wiley, Copyright 2000, p.348.

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the p-n junction as disclosed by Takehara et al. to the power converter in the solar cell module of modified Toyomura in order to get current to flow.

Response to Arguments

5. Applicant's arguments with respect to claims 1-6, 8-9 and 13-16 have been considered but are moot in view of the new ground(s) of rejection as necessitated by amendment.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to **MIRIAM BERDICHEVSKY** whose telephone number is (571)270-5256. The examiner can normally be reached on M-Th, 10am-8pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on (571) 272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/M. B./
Examiner, Art Unit 1795

/Alexa D. Neckel/
Supervisory Patent Examiner, Art Unit 1795